

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1: (Previously Presented) A device, comprising:
a substrate having a cavity that extends into the substrate, the cavity having an opening
on at least one surface of the substrate;
an anode positioned within the cavity of the substrate;
a cathode comprising a first insulating layer positioned above the opening of the cavity,
wherein the anode receives electrons emitted by the cathode, and wherein the
anode produces an electrical current to an external source in response to receiving
the electrons;
a first grid having at least one aperture to allow the passage of electrons therethrough,
wherein the first grid is constructed of an electrically conductive material, and
wherein the aperture of the first grid is positioned between the cathode and
anode;
a seal for creating a controlled environment in an area surrounding the first grid, the
cathode and the anode, wherein the controlled environment allows for electron
flow between the cathode, first grid and anode;
a circuit for heating the cathode, and
a control circuit for controlling the magnitude of the flow of electrons through the
aperture of the first grid, thereby controlling the electrical current produced by the
anode.

Claim 2: (Original) The device of claim 1, wherein the first grid is mounted on the
anode.

Claim 3: (Original) The device of claim 1, wherein the first grid is configured with a plurality of apertures sized to allow the first grid to control the flow of electrons from the cathode to the anode when a control voltage is applied to the first grid.

Claim 4: (Original) The device of claim 1, further comprising a second grid having a plurality of apertures configured for allowing the passage of electrons therethrough, wherein the aperture of the second grid is positioned between the cathode and anode, and wherein the second grid controls the flow of electrons from the cathode to the anode when a control voltage is applied to the second grid.

Claim 5: (Original) The device of claim 4, wherein the plurality of apertures of the second grid are aligned with the plurality of apertures of the first grid.

Claim 6: (Original) The device of claim 4, wherein the cathode is attached to the substrate to create a vacuum environment in an area surrounding the first grid, second grid, anode and cathode.

Claim 7: (Original) The device of claim 1, wherein the cathode comprises an electron emitting coating disposed thereon.

Claim 8: (Previously Presented) The device of claim 7, wherein the electron emitting coating comprises at least one of a metal tricarbonates, strontium, calcium or barium.

Claim 9: (Original) The device of claim 1, wherein the distance between the anode and cathode is between 0.5 microns and 2 millimeters.

Claim 10: (Original) The device of claim 1, wherein the grid is a material selected from the group consisting of tungsten, gold, and tantalum.

Claim 11: (Original) The device of claim 1, wherein the controlled environment is an enclosed area surrounding the grid, cathode, and anode, wherein the enclosed area has a vacuum drawn therein.

Claim 12: (Original) The device of claim 1, wherein the controlled environment is an enclosed area filled with a gas selected from the group consisting of hydrogen, helium, argon, and mercury.

Claims 13-17: (Canceled)

Claim 18: (Previously Presented) A device, comprising:
a substrate having a cavity that extends into the substrate;
an anode constructed of an electrically conductive material, wherein the anode is positioned in the cavity of the substrate;
a cathode comprising a first insulating layer positioned over the cavity of the substrate, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current to an external source in response to receiving the electrons;
a seal for creating a controlled environment in an area surrounding the grid, cathode and anode; and
a circuit configured for heating the cathode.

Claim 19: (Original) The device of claim 18, wherein the cathode is attached to the substrate to create a vacuum environment in an area surrounding the anode, cathode and grid.

Claim 20: (Original) The device of claim 18, wherein the cathode contains an electron emitting coating disposed thereon.

Claim 21: (Previously Presented) The device of claim 20, wherein the electron emitting coating comprises at least one of a monocarbonate, a bicarbonate, a tricarboxate, strontium, calcium or barium.

Claim 22: (Original) The device of claim 18, wherein the space between the anode and cathode is between 0.5 microns and 2 millimeters.

Claim 23: (Previously Presented) The device of Claim 1, wherein the first insulating layer comprises ceramic or silicon dioxide.

Claim 24: (Previously Presented) The device of Claim 1, wherein the cathode further comprises a first conductive layer in contact with the first insulating layer.

Claim 25: (Previously Presented) The device of Claim 24, wherein the first conductive layer comprises at least one of nickel, tantalum, platinum, tungsten, molybdenum, chromium/tungsten, titanium/tungsten, conductive alloys or intermetallic material.

Claim 26: (Previously Presented) The device of Claim 24, wherein the cathode further comprises a second conductive layer in contact with the first insulating layer.

Claim 27: (Previously Presented) The device of Claim 26, wherein the cathode further comprises a second insulating layer in contact with the second conductive layer.

Claim 28: (Previously Presented) The device of Claim 18, wherein the first insulating layer comprises ceramic or silicon dioxide.

Claim 29: (Previously Presented) The device of Claim 18, wherein the cathode further comprises a first conductive layer in contact with the first insulating layer.

Claim 30: (Previously Presented) The device of Claim 29, wherein the conductive layer comprises at least one of nickel, tantalum, platinum, tungsten, molybdenum, chromium/tungsten, titanium/tungsten, conductive alloy or intermetallic material.

Claim 31: (Previously Presented) The device of Claim 29, wherein the cathode further comprises a second conductive layer in contact with the first insulating layer.

Claim 32: (Previously Presented) The device of Claim 31, wherein the cathode further comprises a second insulating layer in contact with the second conductive layer.